

WHAT IS CLAIMED IS:

1. An apparatus for controlling the position of a screen pointer for an electronic device having a display screen, the apparatus comprising:
  - a light source for illuminating an imaging surface, thereby generating reflected images;
  - 5 a motion transducer;
  - a lens for receiving the reflected images and directing the reflected images onto the motion transducer, the motion transducer including an electronic shutter for controlling the amount of time that light is collected for image frames, the motion transducer configured to generate digital representations of
  - 10 the reflected images, the motion transducer configured to generate movement data based on the digital representations of the reflected images, the movement data indicative of relative motion between the imaging surface and the motion transducer; and
  - a controller coupled to the light source for turning the light source on
  - 15 only during the time that light is being collected for an image frame.
2. The apparatus of claim 1, wherein the amount of time that light is collected for image frames is variable, and wherein the amount of time that the light source is turned on for image frames is variable.
- 20 3. The apparatus of claim 1, wherein the light source is controlled by a shutter signal that also controls the electronic shutter.
4. The apparatus of claim 1, wherein the apparatus includes a low power
- 25 mode and a full power mode, and wherein the apparatus is configured to calculate a time average of the movement data and determine whether to switch from the low power mode to the full power mode based on the calculated time average of movement data.

5. A method of controlling the position of a screen pointer for an electronic device having a display screen, the method comprising:
- directing light from a light source onto an imaging surface, thereby generating reflected images;
  - 5 focusing the reflected images onto an array of photo detectors;
  - digitizing output values of the photo detectors, thereby generating digital representations of the reflected images;
  - correlating at least one version of a first one of the digital representations with at least one version of a second one of the digital representations to
  - 10 generate motion data indicative of relative motion between the imaging surface and the array of photo detectors;
  - turning the light source off during the digitizing and correlating steps;
  - and
  - adjusting the position of the screen pointer in accordance with the motion
  - 15 data.
6. The method of claim 5, and further comprising:
- providing an electronic shutter for controlling the length of time that light is collected for each digital representation; and
  - 20 varying the length of time that the light source is on based on the length of time that light is collected for each digital representation.
7. The method of claim 6, and further comprising:
- controlling the light source by a shutter signal that also controls the
  - 25 electronic shutter.
8. The method of claim 5, and further comprising:
- providing a low power mode and a full power mode;
  - calculating a time average of the motion data;
  - 30 determining whether to switch from the low power mode to the full power mode based on the calculated time average.

9. An apparatus for controlling the position of a screen pointer for an electronic device having a display screen, the apparatus comprising:
- a light source for illuminating an imaging surface, thereby generating reflected images;
  - 5 a motion transducer;
  - a lens for receiving the reflected images and directing the reflected images onto the motion transducer, the motion transducer including an electronic shutter for controlling the amount of time that light is collected for image frames, the motion transducer configured to generate digital representations of
  - 10 the reflected images, the motion transducer configured to generate movement data based on the digital representations of the reflected images, the movement data indicative of relative motion between the imaging surface and the motion transducer; and
  - a controller for calculating a time average of the movement data, the
  - 15 controller configured to determine whether to switch the apparatus from a low power mode to a full power mode based on the calculated time average.
10. The apparatus of claim 9, wherein the controller is configured to compare the calculated time average of the movement data to a threshold value, and wherein the controller is configured to switch the apparatus from the low power mode to the full power mode if the calculated time average exceeds the threshold value.
11. The apparatus of claim 10, wherein the threshold value is 1 pixel per frame.
12. The apparatus of claim 9, wherein the controller is coupled to the light source, and wherein the controller is configured to turn the light source on only during the time that light is being collected for an image frame.

13. A method of switching an optical screen pointing device from a low power mode to a full power mode, the method comprising:
  - detecting a first movement with the optical screen pointing device;
  - calculating a first value representing an amount of the first movement;
  - storing an accumulated movement value representing an accumulation of previously detected movements;
  - updating the accumulated movement value by adding the first value;
  - comparing the updated accumulated movement value to a threshold value;
  - determining whether to switch to the full power mode based on the comparison of the updated accumulated movement value and the threshold value.
14. The method of claim 13, and further comprising:
  - reducing the updated accumulated movement value by a decay factor.
15. The method of claim 13, and further comprising:
  - switching to the full power mode if the updated accumulated movement value is greater than the threshold value.
16. The method of claim 13, wherein the threshold value is one pixel per frame.
17. The method of claim 14, wherein the decay factor is 0.5.
18. The method of claim 13, wherein the optical screen pointing device is configured to collect and process image data in each of a plurality of frame periods, each frame period including an integration phase during which light is collected, an analog to digital conversion phase during which collected light is converted into digital values, and an image processing phase during which image data is correlated with previous image data to determine movement information.

19. The method of claim 18, wherein the optical screen pointing device includes a light source, the method further comprising:  
turning the light source on only during the integration phase of frame periods.